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(54) Device used for spray coating the hot glassware

(57) This invention relates to a device used for spray coating the hot glassware, which are being transported on a belt conveyor.

The device of the present invention is related to the belt conveyor **(1)** of hot glassware **(2)** and equipped with a processing tunnel **(3),** which is located above the conveyor belt **(4)** of the belt conveyor **(1).** Inside the processing tunnel **(3)** there are two sets of spraying heads installed **(5, 6),** mounted opposite each other at the side walls **(7, 8)** of the processing tunnel **(3).** The set of spraying heads **(5),** placed at one of the side walls **(7)** of the processing tunnel **(3),** is shifted along its axis **(9)** relative to the set of spraying heads **(6),** located at its opposite side wall **(8).** Each spraying head **(5, 6)** is equipped with a pair of spraying nozzles **(11).** The processing tunnel **(3)** has at least one side mixing chamber **(12),** which is open towards its interior and equipped with the mixing fan **(13).** At each end section of the processing tunnel **(3)** the set of adjustable diaphragms is created **(14, 15).** Both end sections of the processing tunnel **(3)** are attached to the induced draught fan **(17).** The device is equipped with tanks **(18),** filled with a liquid coating-forming agent. The tanks **(18)** are placed on the checking scales **(19)** and each tank **(18)** is connected to the spraying heads **(5, 6).**

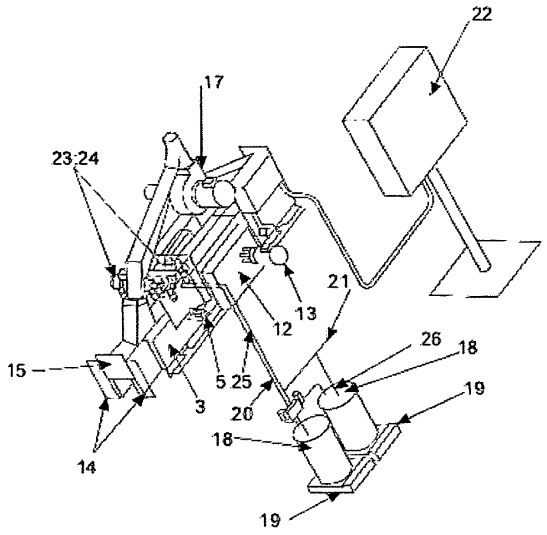

Fig. 1

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Description

[0001] This invention relates to a device used for spray coating the hot glassware, which are transported on a belt conveyor.

[0002] A device used for spray coating the hot glassware is known, as described in Patent Specification PL 84498, as an example embodiment of the invention "Coated glass containers and process for their production." The device is connected to the line forming the glass bottles. After leaving the formation unit, hot bottles at approximately 650°C are being discharged on the conveyor belt and transported through the spray coating capsule, where they are being coated with a liquid coating-forming agent. The spray coating capsule is a tunnel and it is mounted on the frame of the conveyor belt. Two spraying heads are placed on the sides of bottles, one head on each side of the bottle. These heads are equipped with spray nozzles, which outlets are slanted relatively to the longitudinal axis of the conveying belt, in the direction of its movement. A similar device is known from an embodiment of the invention "Method of applying the protective coatings on glass", described in Patent Specification PL 148341. In this known embodiment, provided for applying a protective coating on the milk bottles, bottles formed at approximately 870°K are being transported on the belt conveyor into a tunnel device, which is equipped with four nozzles injecting a coating-forming agent under pressure. In both known embodiments, the bottles covered with a protective coating after leaving the spraying device are transported into the annealing furnace in order to remove internal stresses.

[0003] The device used for spray coating the hot glassware, connected to the belt conveyor and equipped with a processing tunnel which is located above the conveyor belt, whereas spraying heads with spraying nozzles are installed inside the processing tunnel, according to the invention is **characterized in that** the spraying heads are oppositely mounted at the side walls of the processing tunnel, and at each of the side walls of the processing tunnel there are at least two spraying heads located along its axis. The processing tunnel has at least one side mixing chamber open towards its interior and equipped with a mixing fan, which transforms the coating-forming agent into homogeneous mist. The end sections of the processing tunnel are connected to the induced draught fan and fitted with adjustable diaphragms, intended to reduce the air gap clearance. The induced draught fan removes excess coating-forming agent and resulting flue gases from the processing tunnel. The device of the present invention is further equipped with at least one tank, filled with a liquid coating-forming agent. This tank is connected to the device controlling its weight, and it is connected to the spraying heads. In order to achieve a uniform coating process the set of spraying heads, which are located at one of the walls of the processing tunnel, is shifted along its axis relative to the set of spraying heads placed at the opposite wall of the processing tunnel. Most preferably, the oppositely located sets of spraying heads are mutually shifted by a distance that ranges from 0.1 to 0.5 length of the processing tunnel. Such a distribution of spraying heads prevents the formation of dead zones, where there is an insufficient mist concentration of the coating-forming agent. To enable free adjustment of the flow direction for a coating-forming agent, the spraying heads are pivotely mounted (*tiltingly ?*) in the horizontal and vertical direction, and each of them has at least one spraying nozzle. The quantity of used spraying heads depends on the speed of conveyor belt transporting coated glassware, on their distribution density on the belt, and on the configuration of their surface, especially on the type of convexities and cavities. In a preferred embodiment of the invention the processing tunnel has on the sides two oppositely located mixing chambers with the mixing fans, which are mutually shifted along its axis by a distance corresponding to the mutual shift of opposite sets of the spraying heads. In order to reduce heat loss inside the processing tunnel at each of its end section there are two side diaphragms located opposite each other and one upper diaphragm. The end sections of the processing tunnel are connected to the induced draught fan, which draws out excess of a sprayed coating-forming agent and flue gas. To ensure continuous operation, the device has two tanks filled with a coating-forming agent that are used alternately. Both tanks are placed on the checking scales and they are situated at a distance from the conveyor of the glassware. Due to variation in the vertical position of the tanks, their connection to spraying heads is a flexible cable. The device according to the invention has a compressed air connection, which is linked to the spraying heads and to the tanks with a coating-forming agent. This connection is made up of flexible cables and equipped with an air filter and a pressure-reducing valve. The filter removes solid particles and water droplets, whereas the valve maintains operating air pressure at the designated level regardless of pressure fluctuations in the network. The device is also equipped with a freestanding power supply and electrical control cabinet, located at a distance from the conveyor. This cabinet, as well as tanks with a coating-forming agent are located at such a distance that during transportation of hot glassware, they are not exposed to the harmful effects of thermal radiation. The device of the invention is linked to the glassware conveyor in a separable manner, so it can be fairly easily removed and, depending on the needs, it can be used in different processing lines.

[0004] The device used for spray coating the hot glassware is shown in the executive example, which Figure 1 shows a perspective view of the device, Figure 2 - a lateral view of the device, Figure 3 - its front view of the inlet side, Figure 4 shows the horizontal section of the processing tunnel and Figure 5 tunnel - a section of its cross-section.

[0005] The device of the present invention is related to the belt conveyor **1**of hot glassware **2** and equipped with the processing tunnel **3,** which is located above the

conveyor belt **4** of the belt conveyor **1.** Inside the processing tunnel **3** there are two sets of spraying heads **5** and **6** installed, mounted opposite each other at the side walls **7, 8** of the processing tunnel. At each of the side walls **7, 8** of the processing tunnel **3** there are placed in series along its axis **9** two spraying heads **5** or **6.** The set of spraying heads **5,** placed at a side wall **7** of the processing tunnel **3,** is shifted along its axis **9** relative to the set of spraying heads **6,** located at the opposite side wall **8.** The oppositely located sets of spraying heads **5, 6** are mutually shifted by a distance **d,** are mutually shifted by a distance **L** of the processing tunnel **3.** The spraying heads **5** and **6** are pivotely mounted in the horizontal and vertical direction, wherein each of them is mounted on a ball joint **10,** attached to the side wall **7** or **8** of the processing tunnel **3.** Each spraying head **5, 6** is fitted with a pair of spraying nozzles **11** with a diameter of 0.7 to 1.4 mm. The processing tunnel **3** has on the sides two oppositely located mixing chambers **12,** which are open towards its interior, and each of which is equipped with a mixing fan **13.** Both mixing chambers **12** together with the mixing fans **13** are shifted relatively to each other along the axis **9** by a distance **D,** which corresponds to the mutual shift of opposite sets of the spraying heads **5** and **6.** On each end section of the processing tunnel **3** there is a set of adjustable diaphragms, consisting of two side diaphragms located opposite each other **14** and one upper diaphragm **15.** The diaphragms **14, 15** are intended to reduce the air gap clearance of the processing tunnel 3 according to the outline of the moving glassware **2.** The end sections of the processing tunnel **3** are also connected with two wires **16** to the induced draught fan **17.** The device of the invention is equipped with two pressurized tanks **18,** filled with a liquid coating-forming agent. The tanks **18** are placed on the scales **19,** automatically controlling their weight, and they are situated at a distance from the belt conveyor **1.** Each of the tanks **18** is connected by a flexible cable **20** with the spraying heads **5, 6.**

[0006] The device is also equipped with a compressed air connection **21** and a freestanding power supply and electrical control cabinet **22,** which is located at a distance from the belt conveyor **1.** The connection **21** is linked to the compressed air network, not shown in Figure, and it is equipped with the filter **23** and a pressure-reducing valve **24.** The connection **21** and its ports **25, 26** are made up of flexible cables and linked to the spraying heads **5** and **6,** as well as to the tanks **18.**

[0007] Hot glassware **2** are transported on the conveyor belt **4** of the belt conveyor **1** and moved continuously through the processing tunnel **3.** The interior of the processing tunnel **3** is filled with the sprayed coating-forming agent, which is supplied under pressure from one of the two tanks **18** and sprayed through nozzles **11** of the spraying heads **5, 6.** During operation of the mixing fans **13** inside the mixing chambers **12** the sprayed coating-forming agent is being mixed with the air and converted into the mist, which settles on the hot surfaces of glassware **2** and forms a uniform coating on the glassware. The induced draught fan **17** expels from the inside of the processing tunnel **3** the excess of a coating-forming agent and resulting flue gas.

The list of markings

[0008]

1 - belt conveyor
2 - glassware
3 - processing tunnel
4 - conveyor belt
5 - spraying head
6 - spraying head
7 - side wall
8 - side wall
9 - axis
10 - ball joint
11 - spraying nozzle
12 - mixing chamber
13 - mixing fan
14 - side diaphragm
15 - upper diaphragm
16 - wire
17 - induced draught fan
18 - tank
19 - checking scales
20 - flexible cable
21 - compressed air connection
22 - power supply and electrical control cabinet
23 - filter
24 - valve
25 - connection port
26 - connection port
d - distance
D - distance
L - length

Claims

1. The device used for spray coating the hot glassware, connected to the belt conveyor of the glassware and equipped with a processing tunnel which is located above the conveyor belt, whereas inside the processing tunnel there are spraying heads with spraying nozzles installed, ***characterized in that*** the spraying heads **(5, 6)** are oppositely mounted at the side walls **(7, 8)** of the processing tunnel **(3),** and at each of the side walls **(7, 8)** of the processing tunnel **(3)** there are at least two spraying heads **(5** or **6)** located along its axis **(9),** wherein the processing tunnel **(3)** has at least one side mixing chamber **(12),** open towards its interior and equipped with a mixing fan **(13),** and the end sections of the processing tunnel **(3)** are fitted with adjustable diaphragms **(14, 15)** and connected to the induced draught fan **(17),** and also is equipped with at least one tank **(18)** filled with

a liquid coating-forming agent, connected to the device controlling its weight and connected to the spraying heads **(5, 6).**

2. The device according to claim 1, ***characterized in that*** the set of spraying heads **(5),** placed on one wall **(7)** of the processing tunnel **(3),** is shifted along its axis **(9)** relative to the set of spraying heads **(6),** located at the opposite wall **(8)** of the processing tunnel **(3).**

3. The device according to claim 2, ***characterized in that*** the sets of spraying heads **(5, 6),** located opposite each other, are mutually shifted by a distance **(d),** which ranges from 0.1 to 0.5 in length **(L)** of the processing tunnel **(3).**

4. The device according to claim 1 or 2 or 3, ***characterized in that*** the spraying heads **(5, 6)** are pivotely mounted *(tiltingly ?)* in the horizontal and vertical direction, and each of them has at least one spraying nozzle **(11).**

5. The device according to claim 1, ***characterized in that*** the processing tunnel **(3)** has on the sides two oppositely located mixing chambers **(12)** with the mixing fans **(13),** which are mutually shifted along its axis **(9)** by a distance **(D),** distance corresponding to the mutual shift of opposite sets of the spraying heads **(5, 6).**

6. The device according to claim 1, ***characterized in that*** at each end section of the processing tunnel **(3)** there are two side diaphragms **(14)** located opposite each other and one upper diaphragm **(15).**

7. The device according to claim 1, ***characterized in that*** it has two tanks **(18)** with a coating-forming agent, which are placed on the checking **(19)** and they are situated at a distance from the conveyor **(1)** of the glassware **(2),** whereas the connection of both tanks **(18)** with spraying heads **(5, 6)** is made by flexible cables **(20).**

8. The device according to claim 1, ***characterized in that*** the connection **(21, 25, 26)** of compressed air is linked to the spraying heads **(5, 6)** and to the tanks **(18)** with a coating-forming agent.

9. The device according to claim 8, ***characterized in that*** the connection **(21, 25, 26)** of compressed air is made up of flexible cables and equipped with a filter **(23)** and a pressure-reducing valve **(24).**

10. The device according to claim 1, ***characterized in that*** it has a freestanding power supply and electrical control cabinet **(22),** which is located at a distance from the conveyor **(1).**

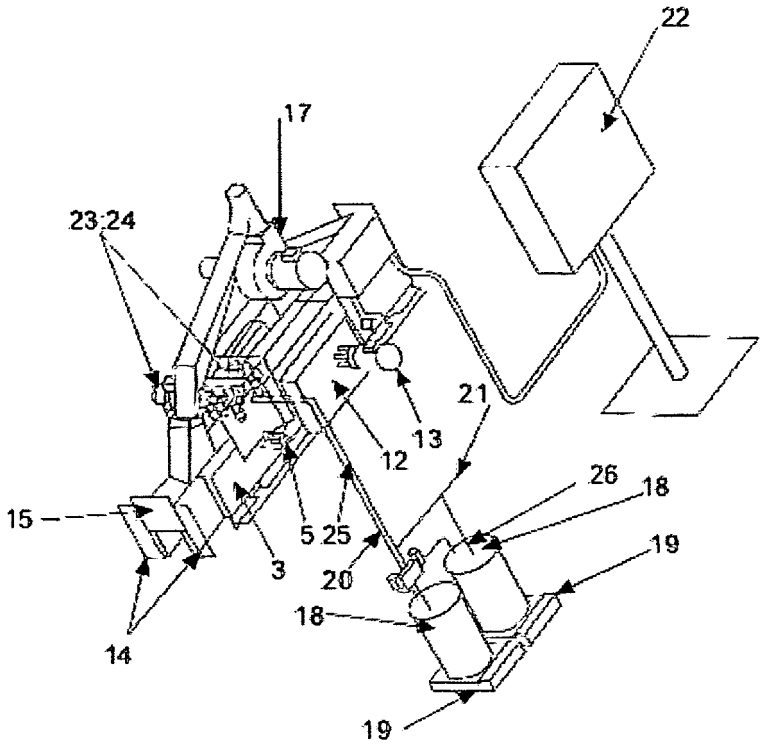

Fig. 1

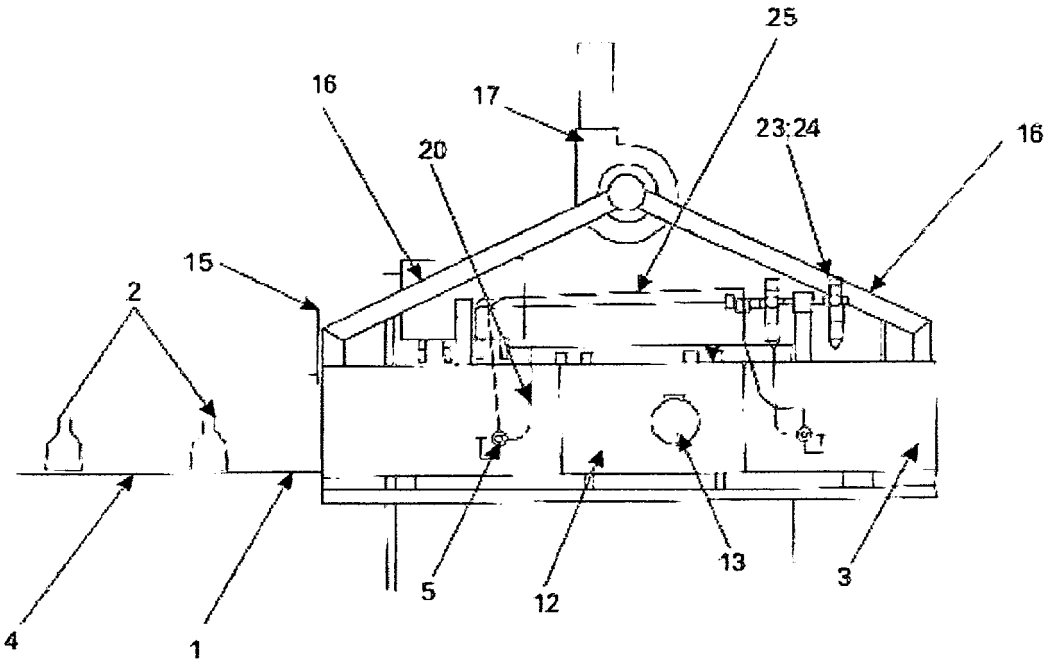

Fig. 2

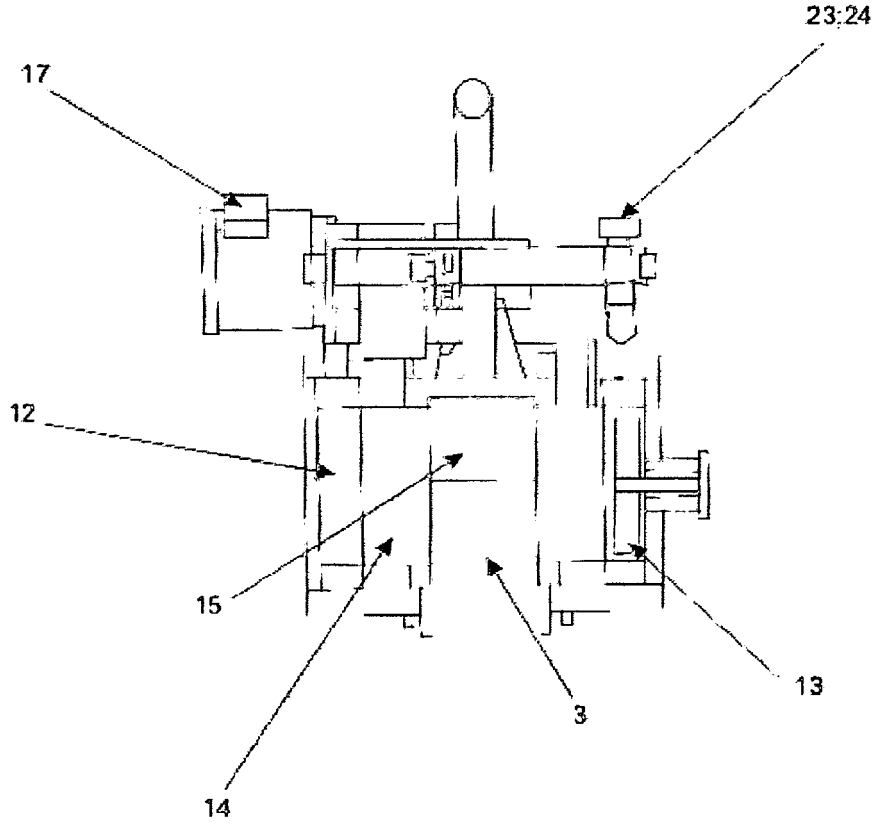

Fig. 3

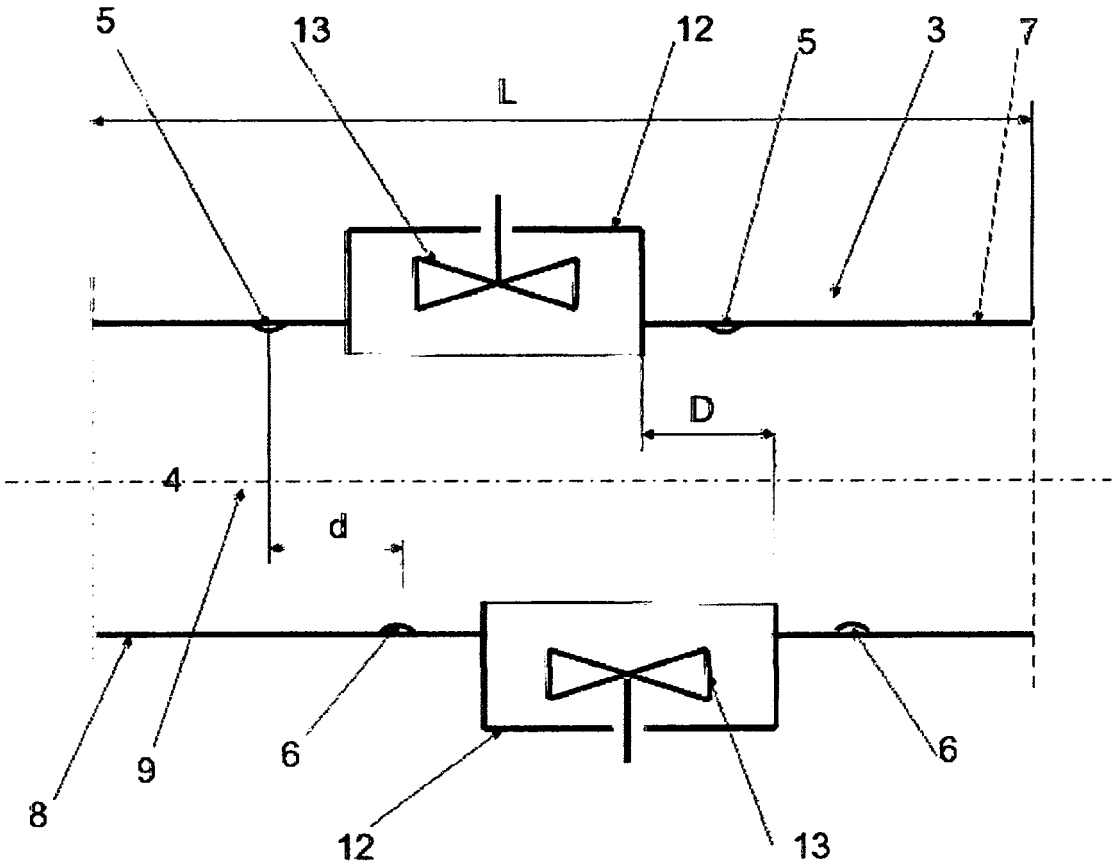

Fig. 4

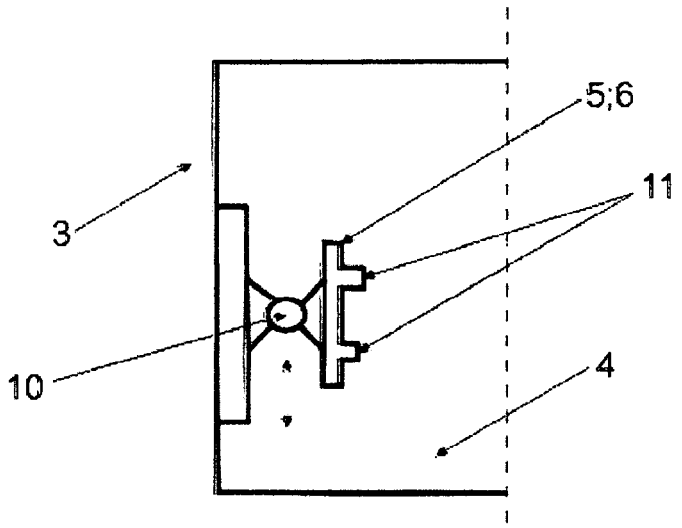

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 12 46 0017

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 September 2012	Baldé, Kaisa

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
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